EXHIBIT B

Cooch, Frank A., IV

From: Carlson, Micah A.
Sent: Thursday, April 04, 2002 11:55 AM
To: Cooch, Frank A., IV
Subject: Mail Memos

These are our program status reports sent to the sponsor on the work we have done. I think they describe the system and our efforts fairly well.

Micah

Nov_01 - Jan_02 Mail Summary R...

Feb_02 Mail ...ummary Report.doc.

EXHIBIT B

1

INTRODUCTION

JHU/APL was requested to develop a mail processing facility to screen irradiated mail for biological agents. The primary purpose of the facility is to eliminate the possibility of contaminated mail from being delivered to members and staff of the U.S. Senate. A secondary objective is to detect letters containing either hoax material or biological threats that have been killed by irradiation. This effort was a direct consequence of the Anthrax contaminated letters sent to Senator Tom Daschle and Patrick Leahy in October 2001. The facility, which is located in Alexandria, Virginia, processes approximately two cages (40-60 trays per cage) per day of first class mail (standard envelopes) using 6 employees during an 8-hour day. Since operations started at this facility in December several hoax letters have been identified. In addition, this facility has equipment for processing larger envelopes used for unfolded papers and other items (referred to as flats) at a rate of approximately 6 cages per day. For this effort JHU/APL selected and made design modifications to processing equipment, designed the air handling configuration, performed extensive testing to verify performance and worked with government employees to develop operating procedures. JHU/APL has also served as a consultant to Pitney Bowes (PB) in the development of a second facility used to screen the mail for the U.S. House of Representatives. This second facility will be used for processing packages in addition to first class letters and flats.

BACKGROUND AND CONCEPTS OF OPERATIONS

In November 2001, APL was asked to create a mail-processing facility in Alexandria to eliminate the possibility of contaminated mail reaching the Senate. Within a one-month time period APL designed and implemented a system that would detect biological threat agents. All mail entering this facility was to be irradiated by the USPS to eliminate the hazard from live biological agents. The USPS with the support of other government agencies performed extensive testing to verify that adequate doses of radiation were being delivered to all mail entering the facility. Irradiation was accomplished through the use of electron beam with sufficient power to obtain 12 logs of kill of spores. Although it is assumed that all biological agents are killed in the irradiation process, it was deemed necessary to perform additional screening to ensure that no live threats passed through the system. In addition, after irradiation, powder (either hoax or biological) will remain in the letter. Delivery of letters containing powder will result in disruptions in the receiving office and building.

Several design iterations were required to determine the optimal end-to-end process to increase the chance of detecting real and hoax threat materials in envelopes and flats. After significant testing with available equipment, a finalized process was developed. The process begins by sorting postcards from envelopes to reduce obscurant aerosols generated during the jog process. The postcards and similar open items are jogged and sampled separately to detect cross contamination on the external surfaces. This step is required because early test results showed that significantly higher particle counts come from post cards and can mask the presence of powder in an envelop. Figure 1 below shows the particle count measurements while processing postcards.

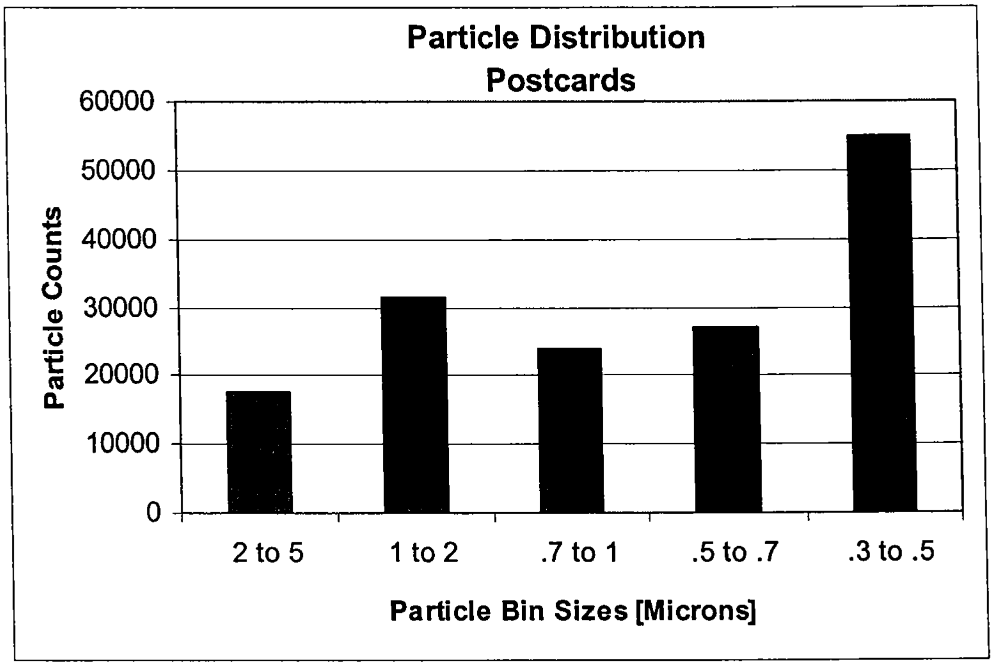

Figure 1: Particle size distribution for postcards

For envelopes, first the corner is cut off, and then the envelope is jogged in an orientation to liberate particulate matter from the cut corner. A particle counter constantly monitors the particle generation from the jogging process, triggering an alarm if the particles exceed a predefined threshold value. Figure 2 below illustrates the comparison of particle count measurements taken when processing contaminated mail (Bentonite as simulate) versus clean mail.

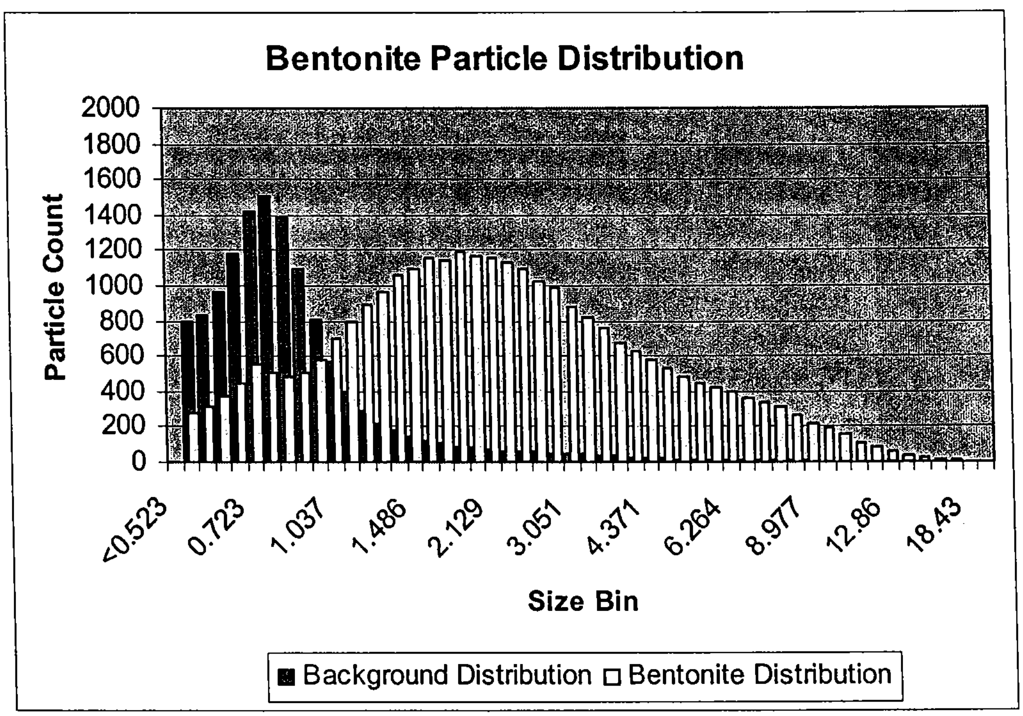

Figure 2: Comparison of contaminated vs. non-contaminated mail

When an alarm is triggered, the operator removes the envelopes or flats from the jogger and sets them aside for visual inspection. As part of the detection system, a Dry Filter Unit (DFU) captures any aerosolized particles removed during jogging. The process for screening envelopes is illustrated in Figure 3 below.

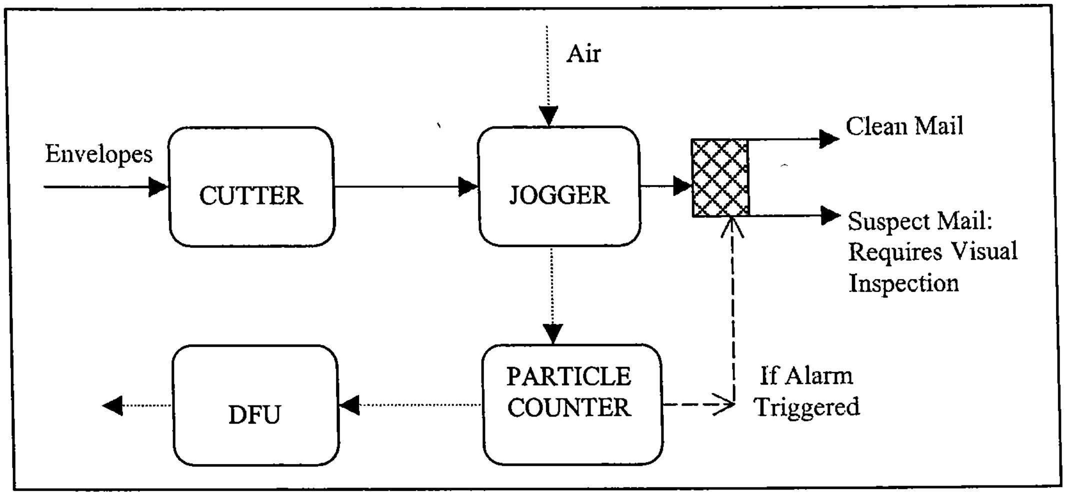

Figure 3: Process flow for envelopes

FIRST CLASS JOGGER DESIGN

The system uses joggers that serve to shake the attached items. JHU/APL designed and tested a variety of attachments to the jogger to effectively liberate particulates from the envelopes. One such variation on these attachments can be seen in Figure 4 below.

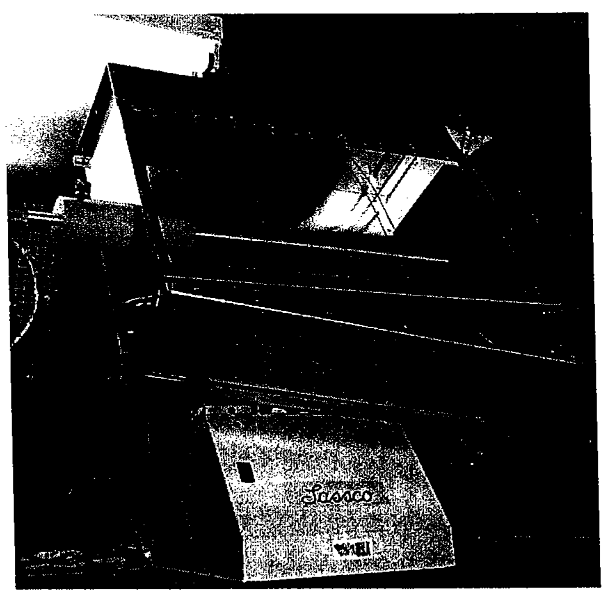

Figure 4: Picture of a Lassco Jogger with a customized envelope box attachment.

The jogger attachments are mounted to standard jogger bases that provide mechanical agitation. Initially, joggers were purchased from Lassco and modified to match the final design described below. With constant operation, the Lassco joggers were showing signs of substantial wear. JHU/APL located and tested an alternative commercial jogger unit manufactured by Brackett that is currently being incorporated.

Variations in the jogger attachment designs were extensively tested. The jogger box design holds the correct orientation of the letter in a contained box mounted to the commercial jogger mechanism. The addition of a cover contained any released particulates, and a mechanism to squeeze the envelopes helped promote particle release from the envelopes. The final design includes the design concepts listed below.

- Angle the envelopes at a 60° front-to-back angle
- Angle the envelopes at a 0 degree horizontal angle
- Cover the items to contain any upward released particulates
- Maintain a vacuum on the contained items to draw particulates past the sample port and away from the operator
- Incorporate a squeezing or pressing mechanism to enhance particle extraction
- Maintain low weight to reduce mass damping

FLATS JOGGER DESIGN

Experience from the design of the first class jogger enabled the flats jogger to be designed in a single iteration. The flats are loaded vertically rather than horizontally due to size constraints. As such, the pressing mechanism is located on the front cover of the box rather than on the side. Other than these necessary configuration changes, the concept between the two designs are very similar.

CUTTER DESIGN

Lassco also manufactures the corner rounders being used to open the envelopes. These units, like the joggers, were beginning to show signs of wear. In January it was decided to redesign automated letter openers for use as a corner cutter. The current corner rounders have suffered from the prolonged use beyond their design expectations. As a result, critical failures have occurred including motor failure or bearings seizure, and those related to the wear of the blades. The blades are no longer sharp enough to satisfactorily cut the envelopes and are instead "tearing" the envelopes, which results in a ragged edge. There is also a concern that the cuts made by the corner rounders might seal or crimp the edge of the envelope and reduce the efficiency of extraction. Using a modified letter opener will allow for a more robust system, as well as faster throughput. A modified letter opener would slice rather than shear the envelopes, which may improve sampling. Initial concept development has centered around modification of a standard letter opener produced by Martin-Yale.

DETECTION SYSTEM

To measure the expected increase in particle counts associated with the jogging and cutting processes, three CLIMET particle counters were placed at various locations within the facility. Several tests were conducted to determine the optimum location for the particle counter. The initial concept was that there would be a substantial release when the corner was cut. Testing indicated that this was not the case, and that the greatest particulate count was seen at the jogger. It was ultimately decided to put the particle counter at the location of the jogger because high particle counts were observed at this location when jogging test mail doped with bentonite.

In addition to defining the optimum location for the particle counter, the threshold value for sounding the alarms also had to be defined. To determine this threshold value, background measurements were made when processing both test and real mail with and without a doped envelope. The particle counts measured when processing test and real mail was typically on the order of 4000-5000 particles. In contrast, when jogging a set of test mail with a doped envelope, the measured particle counts exceeded 50,000 particles per 12-second sample. Based on the results of the background testing, it was decided to set the trigger level to 30,000. This threshold value was conservative and would ensure a high probability of finding particulates within an envelope.

The use of the Climet particle counter for detection of material in envelopes was implemented both to catch hoax materials and to provide an early warning of a potentially contaminated letter. The critical component of the detection system was the Dry Filter Unit (DFU), which was used to collect the particulate matter on a filter. The DFU is plumbed to the jogger via 4" duct for sampling, and is exhausted into the HEPA unit. The DFU was modified from its original configuration by placing a manifold on the front end. This allowed for up to four samples to be collected from four separate joggers. The DFU filters are typically changed once a day and sent to USAMRID for PCR analysis and plating.

A test was conducted to ensure satisfactory collection on the filter membranes. PSL beads were introduced into the air stream in the current configuration, and fluorescent concentration appeared satisfactory. An addition was made to the DFU for the purposes of this study. In order to prevent "blow by" and to secure the samples, standard rubber O-rings were fitted to the sample ports. Based on observation of both the PSL bead study and the filter samples, the rings appear to be beneficial and will be recommended for deployment to all DFUs in place.

PITNEY BOWES FACILITY

In addition to the facility in Alexandria, the mail processing facility for the House and Library of Congress was also setup to screen for contaminated mail. Pitney Bowes (PB) is responsible for the design and development of this facility. Currently the facility is located in temporary trailers in Federal Center South East; however they are expected to open a permanent facility in Prince George's County.

The PB equipment is based on an early design iteration from the Alexandria facility. The concept behind the design was transferred to their custom design group in Connecticut and they produced an automated system to jog and press the mail. This equipment is suffering from similar if not greater equipment failure problems than were observed in the Alexandria facility, and has been found to not operate with the same efficiency of extraction as the equipment designed for the Senate. To assist PB in their design of their facility, JHU/APL has made recommendations on design modifications based on lessons learned from the Alexandria facility. In support of PB, JHU/APL examined some of the flow characteristics of the HVAC system to ensure that particles released from the filter were captured by the DFU.

CURRENT STATUS

Currently there are two mail-screening setups in place at the Alexandria facility. Each setup consists of a 6-foot hood and a flats jogger hooked to a DFU, and a 10-foot hood with 2 cutters and a single first class jogger hooked to a Climet Particle Counter and a DFU filter (see Figure 4 below).

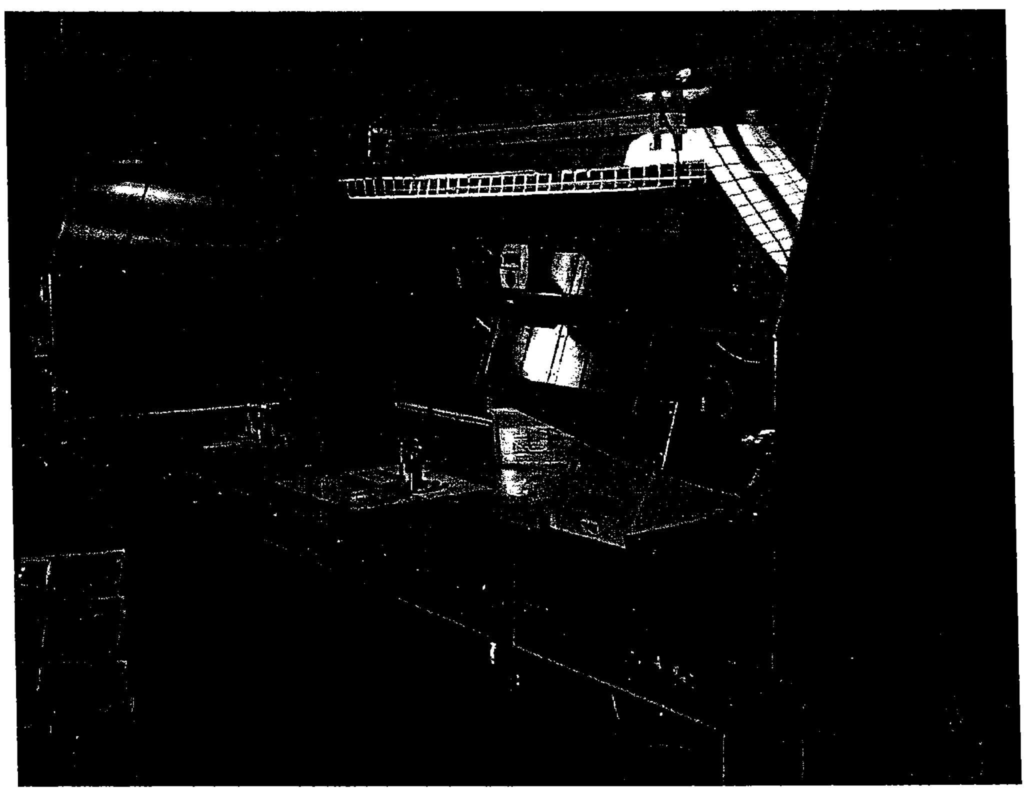

Figure 5: Envelope processing bench

The hoods help to reduce worker exposure to any biological aerosols the systems detects. It is important to note that all mail received at this facility should have gone through the irradiation process, and that all biological material should be neutralized.

Operating the equipment inside of a hooded system significantly reduces the potential risk should viable material be contained in any items.

A combination of Lassco and Brackett joggers are currently being used, though additional Brackett systems are on order to replace the failing Lassco units. Although improvements are always being implemented, the facility is currently operating and is processing at twice its intended design capacity. They are currently using approximately 15 workers and are operating the equipment 7 days a week for 10 to 12 hour days to catch up with the backlog of mail arriving from the irradiation facilities. To date, two suspicious letters have been recovered from the facility.

FUTURE PLANS

- New Jogger Design: Fabricate a new jogger design, which should increase particle collection and automate the jogging process.
- Mail sorter: Try to locate a machine that will automatically sort postcards from envelopes
- Detection algorithm improvements: Explore more robust methods of detection which include background characterization
- Cross contaminated mail: Process the mail that was cross contaminated with the Anthrax letter sent to Senators Leahy and Daschle